

## 1 Claims

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- 3 1) A cartridge for use in a Surface Plasmon Resonance
- 4 sensor, the cartridge comprising an optical element
- 5 having a first surface and a mounting member for
- 6 supporting a sensing agent located on a second
- 7 surface of the optical element, the first surface
- 8 comprising a first means for directing a beam of
- 9 light incident on the optical element towards the
- 10 second surface at an angle of incidence to the second
- 11 surface that results in substantially total internal
- 12 reflection of the beam of light at an interface of
- 13 the mounting member and the second surface wherein
- 14 the cartridge further comprises a detachable channel
- 15 suitable for containing a fluid sample to be tested.
- 16
- 17 2) A cartridge as claimed in Claim 1 wherein the channel
- 18 locates on the second surface of the cartridge such
- 19 that the fluid sample contained within the channel
- 20 makes physical contact with the sensing agent.
- 21
- 22 3) A cartridge as claimed in Claim 1 or Claim 2 wherein
- 23 the optical element further comprises a third surface
- 24 for the exit of beam of light from the optical
- 25 element wherein the third surface includes a second
- 26 means for directing the beam of light.
- 27
- 28 4) A cartridge as claimed in any of the preceding Claims
- 29 wherein the optical element comprises a material
- 30 having a first dielectric constant while the mounting
- 31 member comprises a material having a second
- 32 dielectric constant wherein the second dielectric
- 33 constant is of an opposite sign to that of the first
- 34 dielectric constant.

- 1
- 2 5) A cartridge as claimed in any of the preceding Claims
- 3 wherein the first means for directing the light beam
- 4 comprises a focusing element for focusing the beam of
- 5 light to a line at the interface of the mounting
- 6 member and the second surface.
- 7
- 8 6) A cartridge as claimed in any of Claims 3 to 5
- 9 wherein the second means for directing the light beam
- 10 comprises a defocusing element.
- 11
- 12 7) A cartridge as claimed in any of the preceding Claims
- 13 wherein the mounting member comprises a metal.
- 14
- 15 8) A cartridge as claimed in any of the preceding Claims
- 16 wherein the optical element comprises an injection
- 17 moulded plastic material.
- 18
- 19 9) A cartridge as claimed in any of the preceding Claims
- 20 wherein the sensing agent comprises one or more
- 21 antibodies each antibody being suitable for binding a
- 22 pathogen.
- 23
- 24 10) A cartridge as claimed in Claim 9 wherein the bound
- 25 pathogen is selected from the group comprising
- 26 Legionella, Escherichia coli, Salmonella, Bacillus
- 27 Anthracis, Yersinia Pestis, Lysteria,
- 28 Cryptosporidium, Variola virus, Picomaviridae
- 29 Apthovirus, Filoviruses, any plasticiser, steroid,
- 30 medicinal drug or illicit substance or any other
- 31 known fluid borne bacterium.
- 32

- 1 11) A cartridge as claimed in Claim 9 or Claim 10 wherein  
2 a protein substrate and a ligand is employed to bind  
3 a biotinylated antibody to the metal.  
4
- 5 12) A cartridge as claimed in Claim 11 wherein the  
6 protein substrate comprises biotin.  
7
- 8 13) A cartridge as claimed in Claim 11 or Claim 12  
9 wherein the ligand comprises a protein selected from  
10 the group comprising avidin, strepavidin and  
11 neutravidin.  
12
- 13 14) A Surface Plasmon Resonance sensor comprising a light  
14 source for generating a beam of light, a cartridge as  
15 claimed in any of Claims 1 to 13, and a light beam  
16 detection means wherein the employment of the  
17 cartridge allows for the miniaturisation of the  
18 sensor.  
19
- 20 15) A Surface Plasmon Resonance sensor as claimed in  
21 Claim 14 wherein the light source comprises a diode  
22 laser.  
23  
24
- 25 16) A Surface Plasmon Resonance sensor as claimed in  
26 Claim 14 or Claim 15 wherein the light beam detection  
27 means comprises a detector and a data processing  
28 means.  
29
- 30 17) A method of field detection of one or more pathogens  
31 that comprising the steps of:  
32 1) Selecting an appropriate cartridge for the  
33 detection of one or more pathogens for use in a  
34 Surface Plasmon Resonance sensor;

- 1        2) Calibrating the Surface Plasmon Resonance sensor;
- 2        and
- 3        3) Testing a fluid sample for the presence of one or
- 4        more of the pathogens;
- 5
- 6    18) A method of field detection of one or more pathogens
- 7        as claimed in Claim 17 wherein the selection of the
- 8        appropriate cartridge comprises locating the
- 9        cartridge with one or more appropriate antibodies for
- 10       binding with the one or more pathogens.
- 11
- 12    19) A method of field detection of one or more pathogens
- 13        as claimed in Claim 17 or Claim 18 wherein
- 14        calibration of the Surface Plasmon Resonance sensor
- 15        comprises:
- 16        1) Irradiating a mounting member with a beam of light
- 17        in the absence of the fluid sample; and
- 18        2) Detecting a component of the beam of light
- 19        reflected from the mounting member and storing the
- 20        data as a reference signal;
- 21
- 22    20) A method of field detection of one or more pathogens
- 23        as claimed in Claim 17 to Claim 19 wherein the
- 24        testing of a fluid sample for the presence of one or
- 25        more pathogens comprises:
- 26        1) Locating the fluid sample with respect to a
- 27        channel;
- 28        2) Connecting the channel to the cartridge;
- 29        3) Irradiating the fluid sample with the beam of
- 30        light;
- 31        4) Detecting the beam of light reflected from the
- 32        mounting member and storing the data as a sample
- 33        signal; and